

REMARKS

Status of the Claims

In the present Office Action, several of the previous rejections were maintained, with the Examiner asserting that his earlier rejections were based on Jurus U.S. Pat. No. 5,740,609, rather than Jurus '810.

In the present Office Action, claims 2, 16, 29-44, and 47 were rejected under 35 U.S.C. § 112 as being indefinite or unclear.

In the present Office Action, claims 1-3, 7-10, 12-19, 23-24, 26, 29, 51-52, and 56-57, were rejected under 35 U.S.C. § 103(a) as being obvious over Jurus '609 in view of Evans.

In the present Office Action, claims 5-6, 21-22, 30-37, 40-41, 45-46, 55, and 58 were rejected under 35 U.S.C. § 103(a) as being obvious over Jurus '609 in view of Evans and further in view of Ashley, Jr., et al. (hereafter Ashley).

In the present Office Action Response, Independent claims 1, 15, 30, 45, and 51 are herein amended. Dependant claims 7, 8, and 39 are also herein amended to address formalities

Argument

I. The Present Application

Claims 1-58 are presently pending in the present application, titled Wheels of Single Component Construction and Method of Making, which is directed towards a method of manufacturing a unitary steel wheel having a 5° taper bead seat, equipment required therefore, and the resultant improved wheel. The application as pending comprises five (5) independent claims, and forty (40) claims depending from those independent claims. Thirteen (13) dependant claims were previously cancelled.

At the present, almost all commercially produced wheels are manufactured from several components, which are later joined to form a complete wheel assembly, which includes a center disk portion for mounting to the hub of a vehicle, and an outer rim portion, onto which a tire may be mounted. Wheels which form the center disk and the rim separately have issues regarding concentration of stresses resultant from the joining method, while wheels which use a multi-part rim section have not only stress concentration problems, but also sealing problems between the halves of the rings.

Prior art unitary wheels are limited, in that the shapes which could be formed were not practical with existing vehicle requirements, were formed out of materials such as aluminum, which do not share the strength and cost advantages of steel, or relied on processes which introduced adverse characteristics to partially formed wheels, such that later processing steps were impeded. Accordingly, the few attempts at the fabrication of unitary steel wheels have not been commercially successful.

Furthermore, the attempts at forming such wheels resulted in the center disc portion of the wheels being located outside of the cylinder formed by the outer rim. As loading of the outer rim from a tire occurs at and between the bead seats, the load being completely offset to one side of the junction between the outer rim portion and the center disc portion results in a significant bending moment being created at the junction, since all of the load occurs on one side of the junction, i.e., the load is not distributed on both sides of the junction to allow some balancing of the forces applied at the junction.

The present invention utilizes a round steel blank which is spin formed to form a cylindrical section, which comprises the center disk and complete rim. The steel blank is provided with a center hole, the center of which forms the axis of rotation of the blank for the manufacturing operations. The blank is first spin formed to form a cylindrical preform, which is then further processed in a spin forming machine to form inner and outer bead seats and flanges on the cylindrical outer portion of the preform. One bead seat of the present invention utilizes a 5° taper. Finally, additional features as required, such as mounting bolt holes and vent holes to allow air circulation, may be formed on the unitary wheel.

The independent claims of the present application have been amended to more clearly identify the structural relationship between the outer rim and the center disc portion.

Jurus, U.S. Pat. No. 5,740,609, is directed towards a unitary wheel, however locates both bead seats to one side of the junction between the center disc portion and the rim portion. This is highly significant, since all of the force of tire loading is resolved to one side of the junction, generating higher bending moments at that junction, and allowing greater deflection of the edge of the rim (opposite to the junction between the center disc portion and the outer rim portion) in towards the center of the wheel. Thus, Jurus '609 suffers from greater fatigue concerns as a result of the unbalanced loading and greater deflection resultant.

Jurus, U.S. Pat. No. 4,554,810, is directed towards a segment of a complete wheel. The segment includes part of the outer rim, as well as the center disk. Jurus does require, however, that a second segment complete the outer rim, and be formed separately, and thus does not disclose a unitary wheel, or a method for forming one. In particular, the structure of Jurus does not include both bead seats on a unitary piece.

Evans U.S. Pat. No. 4,185,370 likewise does not disclose a unitary wheel, but rather only a method for forming the outer rim portion, leaving the center disk as a separate assembly.

Ashley Jr., et. al., U.S. Pat. No. 4,962,587 also does not disclose a unitary wheel, but rather a rim portion which would then have to be joined to a center disk.

Beyer U.S. Pat. No. 4,528,734 does describe a unitary wheel, although the fabrication method is limited to the use of soft alloys, as a result of the reliance on forging to form the preform. The use of forging operations work hardens the material, as well as creates a second, significant limitation to the process of forming the wheel: as the preform is formed by forging, the center axis of the pre-form is not of necessity the same as the axis of the spin forming

operation. Thus, not only can the resultant wheel have concentricity issues, spinning operations performed as a later part of the process may see large tool load variations resultant from the lack on concentricity. Thus, the formation of the pre-form through a forging process creates significant limitations, as opposed to the wheel of the present invention.

Furthermore, Beyer suffers from the same limitations as that of Jurus '609: the junction between the center disc portion and the outer rim is outside of both bead seats (or inside of both bead seats, depending on your frame of reference). This results in unbalanced loading, with the resultant bending moment and deflection concerns.

II. Rejections under 35 U.S.C. § 102(a)

The Applicant notes with appreciation that the prior rejections under 35 U.S.C. §102(a) have been withdrawn.

III. Rejections under 35 U.S.C. § 103(a)

In the present Office Action, claims 2, 16, 29-44, and 47 were rejected under 35 U.S.C. § 112 as being indefinite or unclear.

In the present Office Action, claims 1-3, 7-10, 12-19, 23-24, 26, 29, 51-52, and 56-57, were rejected under 35 U.S.C. § 103(a) as being obvious over Jurus '609 in view of Evans.

In the present Office Action, claims 5-6, 21-22, 30-37, 40-41, 45-46, 55, and 58 were rejected under 35 U.S.C. § 103(a) as being obvious over Jurus '609 in view of Evans and further in view of Ashley, Jr., et al. (hereafter Ashley).

The present application includes five independent claims, claims 1, 15, 30, 45, and 51. Each of the remaining claims depend from one of these independent claims, and accordingly the rejections are discussed organized based on the independent claims.

Claim 1 is directed towards the wheel itself, and includes the limitation explicitly.

Claims 15 and 30 are directed towards a process for forming the wheel, and accordingly require the process to form the center disc portion and outer rim with the recited structural relationship.

Claims 45 and 51 are directed towards an apparatus for forming the wheel of the present invention, and accordingly include structure required to maintain the structural relationship between the center disc portion and the outer rim.

**A. Claims 1, 15, 30, 45, and 51 Are Not
 Obvious Over Jurus '609 in View of Evans**

As noted above, Applicant has herein amended the independent claims to more clearly identify the structural arrangement between the center disc portion and the bead seats. Each of the independent claims expressly identify that the junction between the center disc portion and the outer rim is located between the bead seats. The bead seats form the boundary of the tire loading applied to the outer rim, primarily as a result of loads transferred through the sidewalls of tires mounted to the rims. As discussed above, Jurus '609 forms the junction outside of the bead seats, and thus suffers from an infirmity with regards to this loading. Evans does not discuss the center disc portion, nor the resultant issues with respect to the junction between the center disc portion and the outer rim. Accordingly, the addition of Evans to the disclosure of Jurus '609 does not disclose a critical element of the present invention, and cannot render the independent claims obvious. Neither Jurus '609 nor Evans teach a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Jurus '609 nor Evans teach a process for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Jurus '609 nor Evans teach a machine for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Furthermore, as each of the remaining claims rejected as obvious over this combination include this limitation, none of the presently rejected claims can be obvious over the combination.

**B. Claims 1, 15, 30, 45, and 51 Are Not Obvious
 Over Jurus '609 in View of Evans and Ashley**

As noted above, Applicant has herein amended the independent claims to more clearly identify the structural arrangement between the center disc portion and the bead seats. Each of

the independent claims expressly identify that the junction between the center disc portion and the outer rim is located between the bead seats. The bead seats form the boundary of the tire loading applied to the outer rim, primarily as a result of loads transferred through the sidewalls of tires mounted to the rims. As discussed above, the combination of Jurus '609 and Evans fails to teach this limitation.

Also as discussed above, Ashley is also directed towards an outer rim structure only, and thus does not teach or suggest the issues with respect to formation of a unitary wheel. Furthermore, Ashley is silent on the structural relation of the junction between the bead seats and the center disc portion, and thus the addition of Ashley to Jurus '609 and Evan does not disclose or suggest the present invention. Accordingly, the addition of Ashley to the disclosures of Jurus '609 and Evans still fails to disclose or suggest a critical element of the present invention, and cannot render the independent claims obvious. Neither Jurus '609, Evans, or Ashley teach a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Jurus '609, Evans, or Ashley teach a process for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Jurus '609, Evans, or Ashley teach a machine for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Furthermore, as each of the remaining claims rejected as obvious over this combination include this limitation, none of the presently rejected claims can be obvious over the combination.

**C. Claims 1, 15, 30, 45, and 51 Are Not Obvious
Over Jurus '609 in View of Evans and Beyer**

As noted above, Applicant has herein amended the independent claims to more clearly identify the structural arrangement between the center disc portion and the bead seats. Each of the independent claims expressly identify that the junction between the center disc portion and the outer rim is located between the bead seats. The bead seats form the boundary of the tire loading applied to the outer rim, primarily as a result of loads transferred through the sidewalls of tires mounted to the rims. As discussed above, the combination of Jurus '609 and Evans fails to teach this limitation.

Also as discussed above, Beyer has the same infirmity as Juras '609, i.e., the junction between the center disc portion and the bead seats occurs outside of the bead seats, resulting in unbalanced loads generating high bending moments at the junction and greater deflection of the edge of the rim opposite to the junction. Accordingly, the addition of Beyer to the disclosures of Juras '609 and Evans still fails to disclose or suggest a critical element of the present invention, and cannot render the independent claims obvious. Neither Juras '609, Evans, or Beyer teach a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Juras '609, Evans, or Beyer teach a process for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Juras '609, Evans, or Beyer teach a machine for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Furthermore, as each of the remaining claims rejected as obvious over this combination include this limitation, none of the presently rejected claims can be obvious over the combination.

D. Claims 1, 15, 30, 45, and 51 Are Not Obvious Over Juras '810 in View of Evans, Ashley and Beyer

As noted above, Applicant has herein amended the independent claims to more clearly identify the structural arrangement between the center disc portion and the bead seats. Each of the independent claims expressly identify that the junction between the center disc portion and the outer rim is located between the bead seats. The bead seats form the boundary of the tire loading applied to the outer rim, primarily as a result of loads transferred through the sidewalls of tires mounted to the rims. As discussed above, the combinations of Juras '609, Evans, Ashley, and Beyer fail to teach this limitation.

As discussed individually above, each of the references asserted by the Examiner fail to teach this limitation, and accordingly do not render obvious the claimed invention as embodied in the individual claims. Neither Juras '609, Evans, Ashley, or Beyer teach a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Juras '609, Evans, Ashley, or Beyer teach a process for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Neither Juras '609, Evans, Ashley, or Beyer teach a

machine for forming a unitary wheel having the junction between the center disc portion and the outer rim formed between the inner and outer bead seats. Furthermore, as each of the remaining claims rejected as obvious over this combination include this limitation, none of the presently rejected claims can be obvious over the combination.

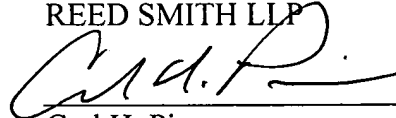
IV. Provisional Obviousness Type Double Patenting

The Applicant notes with appreciation the withdrawal of the prior obviousness type double patenting rejection.

V. Conclusion

Based upon the above remarks, Applicant respectfully requests reconsideration and withdrawal of this restriction requirement and early allowance of the pending claims. Should the Examiner feel that a telephone conference with Applicant's attorney would expedite prosecution of this application, the Examiner is urged to contact the undersigned attorney.

Respectfully submitted,
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